NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

Grassed Waterway
(Acre)
No. 412

Definition

A natural or constructed channel that is shaped or graded to required dimensions and established in suitable vegetation for the stable conveyance of runoff. Grassed waterways with stone centers are also included.

Purpose

To convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding and to improve water quality.

Conditions Where Practice Applies

All sites where added capacity, vegetative protection, or both are required to control erosion resulting from concentrated runoff and where such control can be achieved by using this practice alone or combined with other conservation practices. This practice is not applicable where its construction would destroy important woody wildlife cover and the present water-course is not seriously eroding.

Federal, State, and Local Laws[1]

Design and construction activities shall comply with all federal, state, and local laws, rules, and regulations governing pollution abatement, health, and safety. The owner or operator shall be responsible for securing all required permits or approvals and for performing in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring these permits, rights, or approvals, or for enforcing laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights or approvals to construct, operate, and maintain the practice.

Permits may be required from the following agencies:

1. West Virginia Department of Health

2. West Virginia Department of Agriculture

Planning Considerations

Water Quantity

1. Effects on the components of the water budget, especially on volumes and rates of runoff.

Water Quality

1. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.

2. Filtering effects of vegetation on movement of sediment and dissolved and sediment-attached substances.

3. Short-term and construction-related effects on downstream water resources.

4. Grassed waterways improve water quality mainly by reducing erosion. Grassed waterways facilitate drainage of graded rows, diversions and terrace channels with minimal erosion. This practice may increase runoff volume and decrease soil infiltration. Waterways reduce the formation of gullies thus decreasing the sediment load to adjacent waters.

Design Criteria

Capacity. The minimum capacity shall be that required to convey the peak runoff expected from a storm of 10-year frequency, 24-hour

duration. When slope is less than 1 percent, out-of-bank flow may be permitted if such flow will not cause excessive erosion. The minimum in such cases shall be the capacity required to remove the water before crops are damaged.

In cases where the waterway is to convey flows from a structure that is designed for a greater capacity than the 10-year frequency, the waterway will be designed to handle the same peak runoff as the structure without causing damage by erosion or flooding.

The design for capacity and stability may be calculated by Manning's equation using an "n" value, which takes into consideration the degrees of retardance of various vegetal covers as well as the principle that the retardance to flow varies with the product of the velocity and the hydraulic radius. Designs will normally be based on retardance "D" for stability and permissible velocity and retardance "C" for capacity (top width and depth). Any deviation in retardance will be in accordance with Exhibit 7-2, Engineering Field Handbook. Design procedures are outlined in detail in Chapter 7, EFH.

Velocity. Design velocities shall not exceed those obtained by using the procedures, "n" values, and recommendations in the Engineering Field Handbook or SCS-TP-61, Handbook of Channel Design for Soil and Water Conservation.

Width. ***The channel will be parabolic or trapezoidal. The bottom width of trapezoidal channels shall not exceed 50 feet. The top width of parabolic section shall not exceed 60 feet. Side slopes shall not be steeper than 4:1.***

Depth. The minimum depth of a waterway that receives water from terraces, diversions, or other tributary channels shall be that required to keep the design water surface elevation at, or below, the design water surface elevation in the terrace, diversion, or other tributary channel at their junction when both are flowing at design depth.

Drainage. Subsurface drains (606), underground outlets (620), stone center waterways, or other suitable measures shall be provided for in the design for sites having prolonged flows, a high water table, or seepage problems. Water-tolerant vegetation such as reed canarygrass may be an alternative on some wet sites.

Outlets. All grassed waterways shall have a stable outlet with adequate capacity to prevent ponding or flooding damages. The outlet can be another vegetated channel, an earth ditch, a grade stabilization structure, or other suitable outlets.

Establishment of vegetation. Grassed waterways will be vegetated according to practice standard Critical Area Planting (342).

Considerations

The most critical time in successfully installing grassed waterways is when vegetation is being established. Special protection such as mulch anchoring, straw or hay bale dikes, or other diversion methods are warranted at this critical period. Supplemental irrigation may also be warranted. The vegetation should be well established before large flows are permitted in the channel.

Plans and Specifications

Plans and specifications for grassed waterways shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Operation and Maintenance

An O&M plan shall be developed to maintain waterway capacity, vegetative cover, and the outlet. The following items should be considered when developing the O&M plan:

a. Eliminate grazing until sod is well established. After established, controlled grazing is acceptable.

b. Avoid grazing when waterway is wet.

c. Avoid crossing with farm machinery when waterway is wet.

d. Mow to control weeds and encourage development of a dense sod.

e. Remove heavy growth that will smother grass-legume stand.

f. Eroded or damaged areas should be reseeded or sodded promptly.

g. Apply 400 to 500 lbs 10-20-20 fertilizer to newly seeded waterway during the second growing season. Apply fertilizer when needed thereafter to maintain a vigorous grass-legume cover.

h. Do not permit spraying with herbicides that kill grass.

[1]Bold italics is information added to the National standard by West Virginia

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE GENERAL SPECIFICATIONS

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Areas to be excavated and areas to be occupied by spoil shall be cleared of trees, brush, and other debris as required for construction and maintenance.

Waterways shall be constructed to the line, grade, and section shown on the drawings. The excavated surfaces shall be reasonably uniform and smoothed in such a manner that normal farm machinery can proceed with the establishment of vegetative cover without difficulty.

Spoil shall be placed or graded in such a manner that surface water may enter the waterway freely without scour. Spoil shall be used to fill depressions and shall be blended in with the surrounding topography.

All combustible refuse shall be burned or buried. When buried, all roots, brush, stumps, stones, and similar material shall be placed a minimum of 18 inches below finished grade.

Runoff from diversions or other watersheds shall not be turned into the waterway until satisfactory vegetative cover or protection is established.

When using netting to anchor mulch, the strip should be placed parallel to the direction of flow of water. Waterways should be sloped so that netting will lay evenly over the surface. Fasten ends of netting with wire staples 1 foot apart; fasten edges of netting with wire staples 3 feet apart. On steep waterways, wooden stakes 10 to 12 inches long should be used to replace one-fourth to one-third of the metal pins.

Construction shall be carried out in such a manner that erosion and air and water pollution will be minimized and held within legal limits. This shall be done by:

1. Placing spoil to prevent sloughing or washing into the ditch or water-course.

2. Keeping chemicals, fuel, lubricant, sewage, and waste materials out of the ditch and drainageways.

3. Establishing vegetation on all disturbed areas as soon as possible after exposure or disturbance, especially on ditch sideslopes.